

The instant invention concerns a method to the heating of the wash liquor in a washing machine, in particular in one also for drying furnished washing machine, after the preamble of Claim 1.

In washing machines and drying furnished washing machines (so called Waschtrocknern) in particular a regular seifige wash liquor inserted becomes the washing by laundry. The increase of the cleaning strength the wash liquor becomes usually heated.

With the washing machines the made heating of the wash liquor either by means of a heating element in the caustic solution container or with a Umpumpsystem in an instantaneous water heater, known from the state of the art. These known solutions exhibit various drawbacks.

In both cases the caustic solution in direct contact with the heating element or at least with mostly metallic surfaces, an heating element the inertial, brought becomes. This leads to lime deposits at the heating element and/or, the metallic surfaces and to its/their corrosion and impaired so their operability and life. Since the wash liquor contains usually washactive substances, it affects particularly corrosive in particular with elevated temperature the heating element or the metallic surfaces.

Because must become brought in both cases the wash liquor in contact with the heating element or the metallic surfaces, arises as other drawback a so called dead fleet, D. h. a volume of wash liquor, which is not involved at the wash process, but only the heating element to purposes of the heat transfer washes around. In case of a Umpumpsystem with instantaneous water heater the dead fleet is the volume of the wash liquor contained in the Umpumpsystem and instantaneous water heater. If an heating element arranged in the caustic solution container becomes used, a dead fleet results from the circumstance that the caustic solution container must become the uptake of the heating element additional to the subject-matters which can be washed corresponding large designed and with corresponding more wash liquor filled. With appliances to the washing of laundry this becomes usually received of a rotatable drum, which becomes in the caustic solution container arranged and penetrated of the wash liquor. Between drum and caustic solution container develops so a dead fleet, which becomes enlarged with additional arrangement of the heating element between drum and caustic solution container. The wash time leads the dead fleet always present with the prior art methods to the heating of the wash liquor to an increased detergent, water and an energy consumption and an extended by enlargement of the detergent solution volume which can be heated.

The instant invention is therefore the basis the object to indicate a method to the heating of the wash liquor reduced with which the dead fleet and/or the risk of corrosion and calcifying the heating element and/or the wash time become.

This object becomes 1 dissolved by the features of the claim.

According to invention the method is characterised to the heating of the wash liquor in at least partly with laundry filled a washing machine, in particular a wash dryer, with at least an heating element by the fact that a not aggressive heating medium at at least an heating element by-painted, of this heated will and subsequent with the wash liquor in contact brought becomes. Thus the direct contact between corrosive wash liquor and heater becomes avoided and on the other hand the dead fleet reduced with renouncement of an heating element in the dead fleet. As sequence of it result a longer life of the heating element and a smaller detergent, water and an energy consumption for the washing machine and/or, the wash dryer. If the wash liquor the laundry penetrated, enlarged this the surface, which stand to the heat transfer between heating medium and wash liquor for order, and increased thus the heating effect. If without the heating element in the dead fleet one does not do, reduced itself with greatly increased heating power the wash time significant.

Favourable way is the heating medium air, an air/water mixture or air/steam mixture. By the use of air as heating medium, if necessary together with water and/or, Steam, becomes the energy consumption for the heating of the heating medium due to the low density and heat capacity of air small held and a small corrosion of the heating element assured. Steam possesses besides the advantage particularly to set with its condensation much energy free in the form of warm ones.

Favourable way becomes thereby the laundry at least temporary in the washing machine moved. By the fact assured becomes that the laundry always impregnated with wash liquor and a particularly good heat transfer between heating medium and wash liquor becomes achieved. Furthermore so avoided become that the incoming hot heating medium damages the laundry in the washing machine local superheated and thus the laundry.

Favourable way exhibits the heating medium a temperature of essentially over 130 DEG C and a relative humidity of essentially over 95 DEG. By the use of an high temperature a rapid heating of the wash liquor can be reached, whereby becomes avoided by the high humidity draining of the subject-matters in the washing machine, wetted penetrated, with wash liquor or.

Favourable way becomes that at least heating element both the heating of the heating medium and by air used for drying the laundry. In this particularly favourable embodiment the heating element present in Waschtrocknern anyway to the heating of the drying air becomes also the heating of the wash liquor used and thus an additional separate heating element saved.

Favourable way becomes the heating medium by a supply port in a caustic solution container the wash liquor guided and by an exhausting opening in the caustic solution container discharged located therein, whereby both openings lie over the highest detergent solution conditions. Occurring of wash liquor the channels to the guide of the heating medium becomes so avoided. In a wash dryer anyway the channels present to the guide of the

drying air become also the guide of the heating medium used, so that an additional construction unit expenditure is void.

Favourable way becomes the heating medium by the wash liquor through-blown. Thus one becomes particularly intimate contact between heating medium and wash liquor and a particularly good heat transfer achieved.

Favourable way the supply port and the exhausting opening for the heating medium far from each other remote in the caustic solution container arranged become. Thus achieved that the heating medium puts as large a distance back in the caustic solution container as possible, prolonged with the wash liquor in contact becomes comes and such a good heat exchange between heating medium and wash liquor takes place.

Further the instant invention concerns a washing machine, in particular a wash dryer, with a caustic solution container to the uptake of the wash liquor and the laundry and with at least an heating element, heated by which the wash liquor becomes in accordance with an embodiment of the invention process. With such a washing machine can be obtained a reduced detergent, water and energy consumption as well as a reduced corrosion of the heating element. Furthermore an additional heater is void to the heating of the wash liquor with Waschtrocknern, so that also a smaller size is more attainable and/or, to large volume of dead fleet avoided becomes.

Favourable way becomes in the washing machine according to invention, in particular a wash dryer, the wash, rinsing or cooling water over the same channel and the same opening as the heating medium the caustic solution container supplied. Thus the number can become that direct supply reduced connected at the drum. In particular if the detergent does not become supplied over a rinsing bowl with own feed line the caustic solution container, but in a separate container direct into the laundry given becomes, can so the number of the supply and thus of possible leaking or flaws on a minimum reduced become.

Favourable way the heated heating element also the supplied wash or rinsing water. In this way can be done without a separate heater.

Other details, features and advantages of the instant invention result from the subsequent description of a preferable embodiment bottom reference on the drawing.

In it the single fig shows a schematic structure of a wash and a drying machine for laundry to accomplishing an embodiment of the invention process.

As from the fig apparent, is and the laundry 5 in a drum 3 which can be dried which can be washed, which is again in a caustic solution container 1. The caustic solution container 1 is at least partly 7 filled with wash liquor, which contains washactive substances. Down at the caustic solution container 1 a drain line is 21 connected, in which a pump is 19 to the suction of the wash liquor 7 and the rinsing water at the end of the washing operation provided. To the introduction of the detergent over a short tubular piece above an a rinsing bowl is 23 provided at the caustic solution container 1, 1 flushed from which the detergent as well as fresh water becomes from the water supply 25 into the caustic solution container. Additional one is at the caustic solution container 1 a drying air duct 13 connected. Both ends of the drying air duct 13 flow into the caustic solution container 1 above the highest conditions of the wash liquor 7. In the drying air duct 13 is a fan 11 provided, which rolls the air over in the drying air duct by the caustic solution container 1 and the drum 3 loaded with the laundry 5. In this drying air duct 13 an heating element 9 is to the heating of the drying air, a water supply 15 in direction of flow the rear fan and a water supply 17 before the fan provided.

The introduction of the washing operation the detergent in a rinsing bowl becomes 23 and over the water supply 15 flushed into the caustic solution container 1 and/or over the water supply 25. 17 additional washing water over the drying air duct 13 supplied. The washing water of the heating element, supplied over the drying air duct 13, can become already 9 heated. After reaching the planned quantity at wash liquor 7 in the caustic solution container 1 the drum becomes 3 offset with the laundry which can be washed 5 in rotation, whereby the laundry 5 with the wash liquor 7 is impregnated. To the heating of the wash liquor by the fan 11 over the drying air duct 13 hot air is injected, which becomes 9 heated of the heating element. The hot air washes around the laundry 5 and heated so the wash liquor soaked with wash liquor 7 in the drum 3 including laundry. In order to avoid that the soaked laundry 5 is drained by the hot air, it exhibits these an increased air humidity. In addition the air additional located in the circulation can by one of the water supplies 15 and/or, 17 moistened become.

After completion of the washing operation the wash liquor of the pump becomes 19 over the drain line 21 remote and the remainders of the wash liquor 7 in the laundry 5 by coils with clear water eliminated. The rinsing water can over one of the two water supplies 15 and/or, 17 supplied and by means of the heating element 9 heated become if necessary. To the conclusion of the wash and rinsing procedure we the rinsing water usually by spinners of the drum 3, bonded in the laundry, to a large extent driven out.

Subsequent one becomes the laundry 5 by means of drying air dried, which becomes 9 heated in the channel 13 of the fan 11 circulated and of the heating element.

Thus a method becomes the heating of the wash liquor in a washing machine indicated, in particular a wash dryer by the solution according to invention, with which the corrosive and kalkhaltige wash liquor does not come into direct contact with the heating element and which can become dead fleet of the wash liquor on a minimum reduced. Thus the life and the efficiency of the heating element become increased and the water, detergent and energy consumption lowered.

With use of this method in a wash dryer can be done without to additional a separate heating element to the heating of the wash liquor additional to the heating element required to the heating of the drying air. From this a

construction unit saving with the reduction of the size and increase of the working reliability connected thereby results by reducing the number of components. In the case of additional mounting of a heating element 27 in the space for the dead fleet however the wash time significantly reduced can become, because the heating power is almost doubled thereby.

In particular with household appliances the invention process can become favourably applied, since in such cases particularly a reliable operation is desired, without frequent maintenances, caused by corrosion or calcifying, become necessary.

The invention limited itself not on the described embodiment.

Alternative one can become the invention process also general in wash or winding machines used, becomes heated in which a wash liquor, as for example in a dishwasher. In particular it can become particularly favourable with washing machines inserted, becomes performed in which beside the wash also a drying process.